



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q65526

Shuji ENDO

Appln. No.: 09/922,738

Group Art Unit: 2837

Confirmation No.: 9600

Examiner: Marlon T. Fletcher

Filed: August 07, 2001

For: CONTROL UNIT FOR ELECTRIC POWER STEERLING APPARATUS

RESPONSE UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated January 28, 2003—the period for response having been extended to May 28, 2003, by an appropriate petition and a check submitted herewith—please consider the following remarks.

REMARKS

Claims 1-6 are all the claims pending in the application. Reconsideration and allowance of all the claims are respectfully requested in view of the following.

Drawings

Applicant has submitted herewith new drawings (including 12 sheets having Figs. 1-18) that incorporate the changes as proposed on November 5, 2002, and approved by the Examiner in paper number 9. These new drawings are believed to be in compliance with 37 C.F.R. § 1.84.

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Claim Rejections - 35 U.S.C. § 102

The Examiner rejected claims 1, 2, and 6, under § 102(a) [read 102(e)] as being anticipated by US Patent 6,184,637 to Yamawaki et al. (hereinafter Yamawaki). Applicants respectfully traverse this rejection because Yamawaki fails to disclose all the elements as set forth and arranged in Applicant's claims.

Yamawaki does not disclose a current dither signal generating unit as set forth in claim 1. Claim 1 sets forth that the current dither signal generating unit generates a current dither signal when the motor angular velocity is within a predetermined range of angular speed ω . Although the word "dither" may broadly mean non-steady, the current dither signal generating unit as set forth in claim 1 is arranged to generate its signal when the motor angular velocity is within a predetermined range of angular speed ω . The current dither signal of the present invention is explained with reference to Figs. 15A and 16. Specifically, when the motor 113 is in a completely stationary state, there is a static friction—in the electric power steering apparatus—which makes the driver feel that the steering wheel has been fixed in position. Accordingly, in various embodiments of the present invention, a current dither signal generating unit generates a current dither signal to keep the motor from achieving a completely stationary state. The current dither signal moves the motor only slightly so that the driver does not notice that the power steering motor is being moved.¹

In contrast to that set forth in claim 1, Yamazaki explains, in column 5, lines 16-42, that the detection section 24 detects a non-steady state occurring due to an excess manual steering (i.e., over steering), and generates a modification signal D_H for modifying or adjusting the value of the target motor current signal. But Yamazaki does not disclose that the non-steady state detector section 24 generates its signal when the motor angular velocity of the motor is within a predetermined range of an angular speed; in fact, the non-steady state detection section 24 does not receive any signals based on feedback from motor 8 at all, let alone based on the motor

¹ Specification at: page 1, 1st full paragraph; page 5, 1st full paragraph; page 6, 1st and 2nd full paragraphs; paragraph bridging pages 10 and 11; and paragraph bridging pages 12 and 13.

angular speed. Accordingly, Yamazaki does not disclose a current dither signal generating unit as set forth in claim 1.

With respect to claim 2, Yamawaki does not disclose that the predetermined motor angular velocity corresponds to the static friction. As set forth in the specification, the static friction relates to the force resisting turning of the motor, when the motor is in a completely stationary status. That is, by generating a dither signal to finely oscillate the motor at the motor angular velocity near to zero, the motor oscillates. Therefore, it is possible to avoid the influence of static friction at the motor angular velocity near to zero. Accordingly, as the friction characteristic can be continued at the motor angular velocity near to zero, it is possible to avoid unnecessary feeling of the steering, and it is possible to obtain comfortable steering feeling. See, for example: page 1, 1st full paragraph; page 5, 1st full paragraph; page 6, 1st and 2nd full paragraphs; and page 12, line 13 - page 14, line 16.

In column 6, on lines 28-67, Yamazaki explains the slip of the vehicle and the friction between a road and tires occurring due to an excess manual steering (i.e., over steering). Thus, in contrast to that set forth in claim 2, Yamazaki does not disclose the static friction that resists turning of the motor, as generated in a completely stationary status of the motor. Accordingly, Yamazaki fails to anticipate claim 2.

With respect to claim 6, Yamazaki's block 24, shown in Figs. 2 and 3, is not the motor angular velocity estimating section as set forth in claim 6. Instead, inputs to the block 24 are the vehicle velocity, steering angle, and yaw rate; the motor terminal voltage and motor current are not inputted to non-steady state detector section 24. The output of the block 24 is the modification signal D_H and is not the motor angular velocity estimating value. Accordingly, Yamazaki fails to anticipate claim 6.

Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 3-5 would be allowable if rewritten in independent form. However, because of the belief that claim 1 is allowable as written, Applicant has not rewritten claims 3-5 in independent form.

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Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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